"Alternative Price Adjustment Models for long-term log contracts – impacts on Small Scale Forest Farmers"

by

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Abstract
Small Scale Forest Farmers have the potential to contribute considerably to regional economic activity in terms of forest products grown for the commercial processing industry. Financial returns, economic viability and ecological sustainability are dependent on a number of parameters including yield, species, growth rate, log prices, supply contracts and certification of timber quality. Log prices determination and adjustment through the term of the contract affect financial returns to industrial growers and small-scale forest farmers alike. Maintaining the "real" value of the contract price throughout the term of the contract is imperative.

This paper addresses the issue of log price setting and adjustment for long term contracts of logs supplied from small scale and commercial softwood plantations. Specifically, it deals with the reasons and rationale for adjusting the contract price over time and explores various adjustment models applied in a number of countries. Parallels are drawn and the implications of different adjustment models are assessed as they affect commercial softwood forest growers and small-scale farm foresters.

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1. Introduction

Log sales and supply arrangements vary considerably from country to country. Large industrial and commercial logging operations determine prices and supply in domestic markets in which many small-scale operators have little influence. In Australia, small scale forestry is a relatively new phenomenon with most forest growing and harvesting activities occurring on large tracts of crown land, government owned and administered plantations and large tracts of privately owned special purpose operations. Prices for logs are determined in three recognised markets: the spot market, the short-term contract market and the long-term contract market. In some markets and in some countries log sales are arranged through a spot market at the "roadside". In other countries, supply arrangements include short and long-term contract periods. In the case of contract sales, prices are set by various arrangements including auctions, tenders, negotiations, expressions of interest and proposition calls. Contracts normally include provisions for adjusting the contract price throughout the term of the contract. Different price adjustment methods will have different impacts on the financial returns that suppliers expect to receive over the term of the contract. Small-scale forest farmers may be disadvantaged in negotiating contractual arrangements if they are unaware of the ramifications of the various price adjustment options and the impact on future returns. Leskinen and Kangas (1998) note that. "….the success of regeneration, growth, survival of trees and the development of timber prices…are the main sources of risk in forest planning". Without a knowledge of price movements small scale forest farmers will not be in a position to plan harvesting rotation options.

Market prices and price adjustment options written into term contracts can affect the economic viability of small-scale forest farming operations and are critical to rural farm foresters. These considerations are important if small scale foresters are to be viable economically, and if they are to be a reliable source of commercial forest outputs that can compete with larger industrial commercial operators. These small scale foresters require a wider knowledge of market pricing, price adjustment mechanisms, and contractual conditions of log supply on spot and long term market. Only with an understanding of these conditions and their implications will a wider and more diverse composition of producers emerge in commercial forest activities.

2. Log pricing and Supply Arrangements – An International Comparison

Industry structure and the degree of competitiveness in any industry determine the opportunity for entry of new suppliers into the industry. Many different pricing and supply arrangements are apparent in different timber supplying countries. The structure of the commercial farm forestry plantation industry in many of these countries is highly concentrated at the buyer / seller end of the market (Quayle, 2001). For example, in Australia all but one of the six major activities in the forestry product chain are characterised by high levels of seller concentration. Small scale foresters are therefore dependent on market prices for logs normally set by large commercial foresters negotiating with large sawmilling processors.

The **United States** industry structure is also characterised by these features. In the North West Pacific Region forest ownership is dominated by the public sector with about 63% of the forested land owned and managed by state and federal governments. Industry ownership and other private operators account for the remainder. Most of the timber supplied from these regions is of the softwood variety and is driven by sawlog industry by clearfell operations. Large privately-owned sawmill processors dominate the demand side of the market. Of the estimated 425 sawmills operating on the West Coast, medium –sized independent processors dominate with throughputs between 34,000m^3 and 110,000m^3 per annum, These large suppliers / buyers dominate in this market setting prices for all suppliers. Even though long term contract periods have been reduced to 1 – 2 year periods resulting in more sales and smaller volumes most of the timber market is negotiated between these operators. With over 63% of all forests under the control of state or federal authorities, the public sector has significant influence in the setting of log prices. A transaction evidence appraisal system is used to established base prices in an open auction bidding system. The base price can vary according to species and local conditions. Small-scale foresters and private operators are not significant players in this market in price determination. Sawmilling operations of softwood sawlogs in the US are highly competitive in the next part of the production chain. (Simons 1990, 5-37).

Operations on the East and Southern States of the US are even more efficient than their West Coast counterparts. Processing operators are some of the most efficient in the industrialised world. Supply from these States is organised according to forest ownership. Industrial forest owners derive their timber supply from their own industrial forests. The small number of large softwood timber sawmills most of which are vertically integrated owning private commercial forests, supply mainly *pinus.echinata* and / *P. taeda* to their own mills. Forests that lie substantial distances from the company's mill often will sell log by negotiation to other millers or to log dealers. Direct negotiation between buyer and seller is the preferred sale mechanism.

With nearly 60% of the forests in the Southern States privately owned and classified as non-industrial forests, log sales proceed in a variety of ways. Small landforests normally negotiate directly with the logger, larger land holders supplying larger units may contract with a consulting contractor who organises a closed competitive bid to the processor on behalf of the grower. Logs supplied from public forests are sold through formal sealed bids after a pre-sale assessment on the timber lot is estimated from species type, yield and volume. This information is then published in a prospectus for intended buyers. Softwood plantations account for 29% of the softwood forested area with natural pine forests accounting for a further 40%. These processors can purchase logs from other forests Sale contract periods are for a short 1-2 year duration. Market prices of tendered lots determine log prices, but again with a small number of large processors the market for logs remains highly concentrated.

The implications of dominance by a few large firms controlling the majority of the output in each activities are that these firms will have considerable market power in determining contract prices for inputs, particularly timber inputs. They will be in a position to influence log prices, contract terms, source of supply, volume required and species type. This market power is more magnified when the advantage of location

and transport costs are considered. With established processors already having regional location advantage close to existing forest supplies, other purchasers located far from the forest supplies suffer the disadvantage of increased transport costs for unprocessed bulky log inputs.

Pricing and supply arrangements in **Canada** are varied according geographical region. On the **West Coast** logging is mainly for sawlogs, with most of the 65mill m^3 of timber harvested from provincial government lands (Marguelles, 1995). In the late 1980s the British Columbia Ministry of Forests introduced the Full Market-Based Comparative Pricing System (FCVPS) for establishing stumpage prices for logs. Bidding for timber lots is common but the government authority set "upset" prices for timber lots after a complicated appraisal system. The appraisal system determines the stumpage price in each region with different formulae applying to timber lots coastal districts and inland districts. Statistics Canada compiles a composite index of processed lumber and chip price indices to gauge the importance of timber inputs into the processing industry. Log market values are determined by this index on a species and grade basis. Following this method of a weighted wood index to determine market prices from timber lots, an average stumpage rate for coastal lands on the West Coast was determined as $\$C23.54/m^3$ in July 1998. Further, stumpage rates are estimated with variations across regions according to quality of the timber stand. Some stands will be higher than the average quality timber, while other stands will be lower. Higher valued timber stands based on timber quality will attract a higher stumpage rate. The final appraised selling price is therefore determined by the downstream price value of timber outputs, the expected log price according to the "grade" of timber, and the cost of growing and harvesting the timber as averaged across all harvestable lots. This pricing system, according to some has led to pricing distortions that don't reflect the true value of high value timber lots (see Janakki *et.el.* 1997). The application of this formula in price setting varies across stands of timber. Small-scale forest enterprises may be given allowable concessions through bonus bids on their timber lots to encourage independent production. Stumpage rates are determined according government revenue objectives, systematic and equitable applications (Ministry of Forestry, 98).

On the **East Coast of Canada** Ontario and Quebec are the two provinces engaged in the timber industry. Again provincial governments own and assign logging rights to most of the 60 million hectares of forest on crown land. Log supply agreements on the East Coast are by long term contract for 20 years or more with renewable clause at 5 ear intervals. Stumpage prices for timber logged from public or crown lands is based on residual log prices estimated in the 1970s and indexed using Canadian East Coast lumber and pulp price index (Margueles, 95,40). The processing industry is splintered with many small private millers processing most of the roundwood timber, while the larger mills are involved in pulp and paper manufacturing. The Canadian timber market is highly regulated with the government being a major owner and supplier of forest areas. In contradistinction to that of the US, Canada does not rely on direct market forces of auctions or tenders to determine log prices, rather it uses its complicated appraisal system and downstream timber indices to indicate expected price levels.

New Zealand on the other hand has adopted almost a complete market - oriented pricing system for log exports and for local sawlog milling. Since the late 1980s when the government sold most of its crown forests to private enterprise the government has taken a lesser role in price determination, log allocation and supply arrangements, leaving these activities to the open market. Much of the previously-owned government forests were purchased by large foreign-owned timber processors, vertically integrating their forest timber supplies to their own local processing plants or exporting logs to processing plants off-shore. Carter Holt Harvey, Fletcher Challenge and Rayonnier NZ along with Forestry Corporation of NZ dominate with 63% of forest ownership. Collective small-forest farmers also own quite a significant 20% area of forest plantations.

Forest plantations are concentrated mainly in the North Island. New Zealand is divided into ten (10) forest regions most being located in the North Island where yield of *p.radiata* is highest. While other districts on the North Island are significant in plantation area size, Central North Island and Northland are the largest plantation districts with over 640,000 hectares. It is in these districts that the multinational processors have forest ownership and dominate the log supply market.

Both the Forestry Corporation of NZ and small-scale foresters have some influence in the pricing of logs as they control nearly 35% of the market between them. Despite small scale foresters being small in size and splintered as a supply group, their effect on the market has become significant through the application of the Method for Assessment of Recoverable Volume by log Types (MARVL) classifying logs by export grading. Characteristics considered in the log certification grading process include log size, pruned or unpruned logs and log diameter at the stump. Small–scale farmers with minimum scale forestry operations compete in the log supply market, supply to the major log processors. An earlier study of minimum scale for forest farm size for the North Island indicated that sustainable economic returns were possible from farm forests with woodlots between 25-30 hectares or more (Smaller & Meister, 1983, 19).[1] Recent anecdotal evidence by the author suggests that the required minimum area for small-scale forestry is closer to 30 hectares. Grade certification on each log maximises returns to the grower through specific product pricing techniques rather than relying on an average stumpage price per cubic meter per wood lot area.

Log prices based on product specification and the inclusion of export parity pricing have led to a market price grading scheme that ranges in value from a low NZD50/m^3 for poor quality timber to NZD 200/m^3 for high grade large pruned logs (Ministry of Forestry, 1998). Quarterly tracking of export prices by the NZ Ministry of Forests sets benchmarks for market price negotiations between buyer and seller. With over a third of all New Zealand sawlogs exported to Japan, Korea and the United States, export price parity isolates log prices from the vagaries of the domestic building and construction industries. Over 5.4mill / m^3 of logs were exported from New Zealand in the year ending 1997, signifying the importance of the export parity pricing policy. Similar to the United States, small-forest farmers use independent contractors or brokers to negotiate sale prices with the processors. These contractors are trained and certified to grade timber lots and negotiate prices on a timber specification basis.

[1] This is not dissimilar to the average private forest size of 36-40 ha in Finland (Margules *et.al* op.cit. p 21)

Australian forests cover some 42 million hectares with native forests representing 97% of this area. Commercial softwood / hardwood forest plantations account for approximately 1.2 million hectares and are primarily located on the Eastern seaboard States of Queensland, New South Wales, Victoria, Tasmania and South Australia (ABARE 1999). Despite a strong move towards privatisation and corporatisation in the early 1990s much of these commercial plantations remain under the control of State government forest authorities. The public sector still retains over 50% ownership of commercial plantation forests with majority of these holdings in the states of Queensland and New South Wales. Public ownership of commercial plantations was even higher at 66% in 1995 before Victorain Plantation Corporation sold its harvesting rights to the private sector. Investigating pricing and supply arrangements in these states therefore is appropriate.

Softwood plantations are more common than hardwood plantations in the eastern states of Australia with New South Wales the largest having 293,000 ha and Queensland 173,000ha. (National Forest Inventory, 1998). Hardwood plantations cover a much smaller area in these states as indicated in New South Wales where only 13% of the plantation estate is hardwood. Most pricing and supply arrangements deal with logs supplied from publicly-owned softwood plantations in these states.

The two main plantation areas in **New South Wales** are the Southern and Central Tablelands (SCT) and the Northern Tablelands and North Coast (NTNC) districts. The SCT district covers nearly 100,000 ha of *Pinus radiata* with the capability of expanding to 150,000 ha over an 18 year rotation cycle. In the NTNC district there are an estimated 44,500 ha of commercial plantations – 75% being hardwood varieties *Eucalyptus pilularis* and *E. grandis.* With the potential to expand a further 44,500 ha over the next 20 years in line with industry processing capacity (ABARE 1999 P.177)

Queensland plantations are predominantly in the South-East (SE) and North Queensland (NQ) districts covering an estimated 174,000 ha with 90% still in government ownership. The SE district is the largest with 148,000 ha of exotic softwood varieties *Pinus elliottii* and *P. caribaea* while the native variety *Aracauria cunninghamii* covers 28% of the government-owned plantation area with a potential to expand the forest by 58,000 ha over the 20 yearly growth cycle. Similar to the case of New South Wales, most the commercial plantations are still government-owned and are of the softwood variety. Pricing and supply arrangements are determined through a negotiation process between a large dominant supplier and generally one large buyer -–the processor.

Queensland Department of Primary Industries – Forestry (QDPI-F) - the state government's commercial plantation body - owns, controls, markets and sells logs from the public plantation estates with a market dominance of over 90% of all logs sold. In many instances, these sales are to single processing firms advantageously located near the state forest. While sale by tender or expression of interest is a normal procedure, the number of firms actively involved in the bidding procedure is limited. QDPI-F offers for sale lots of timber on either a clearfell cubic metre basis or

selective felling again by cubic metre. Log specification and certification is not part of the procedure for pricing logs. Propositional Calls from prospective buyers of wood lots and logging contracts are submitted to the supplier for evaluation and further price negotiation. Sale by auction through a bidding process is not a feature of this market. Logging contracts are either long-term (9 - 20 years) or short-term – 3 -5 years. In both cases log prices need to be adjusted over the contract period to ensure prices reflect current market conditions. The Consumer Price Index or a wood weighted index is applied for contract price adjustment. Economic and market conditions are also taken into consideration during the annual review of the contract price.

3. Contract Price Adjustment Models:

For those countries that predominantly sell logs through the auction/tender system in a spot market, no adjustment price mechanism is required. The market conditions on the day determine the price of the logs. On the west coast of the **United States** stumpage prices and volumes are recorded on a monthly basis for sales from the US Forest Service in the western states of Oregon, Washington, Idaho, Montana and California. Stumpage prices are compared to a lumber price index calculated as a delivered log bid price for public timber sold in Western Washington State and Oregon. This is then compared to a lumber price index based on a wood weighted price average of timber (WWPA). In the early 1990s, there was a significant price spike in both the timber price index and the stumpage price from $US450 to $US800 per Mbf. These price movements indicate that current stumpage bid pricing is influenced by the lumber price index movement and price adjustment in bid prices at auctions follow.

Similarly, on the east coast of the United States stumpage prices paid to landowners when buyers harvest the timber from state forests are monitored through the Pennsylvania State University Timber Market report. Prices are recorded for each sale in each district on a quarterly basis for each species. Growers have access to timber prices achieved at recent auctions for specific species and log characteristics. For example, stumpage for pine softwood ranged between US$42 and US$62 per MBF international ¼" standard size. Sales contracts between 1 –2 years is common and no price adjustment process is necessary.

In British Columbia, stumpage is determined by the complex Full Market-based Comparative Pricing appraisal System (FCVPS). This log pricing mechanism is an appraisal system that applies to setting stumpage rates and to their adjustment over the term of the contract. Stumpage rates for long term contract sales are re-calculated and adjusted quarterly in accordance with movements in the lumber and pulp price index as an average for all cutting sites in the previous quarter. Annual stumpage price revision takes into account variations in site specific conditions for adjustment purposes. Normally the relationship between stumpage rate (target rate) and the average price index is fixed unless current government policy changes are to be incorporated. This implies that in British Columbia where a heavily regulated administered log supply and pricing system operates long term contracts are adjusted

on the basis of downstream price movements in processed timber which in turn affect future target prices for timber lots from state forests. Special stumpage rates are applied through a "bonus" bid to timber sold competitively under the *Small Business Forest Enterprise Program* to encourage small forest farmers into the industry.

3.a. Price adjustment in New Zealand

Most of the former New Zealand Ministry of Forests' plantations were sold off to private interests in the late 1980s. Government agencies now own only 30% of the forest plantation estate. Most sales are spot market determined and few long term contracts for suppliers remain. Stumpage price issue is therefore not an issue. Nevertheless, market prices are determined by market conditions and previous log prices achieved in the domestic and export markets. Log prices are recorded by the Ministry of Forests for graded logs of 20 and 30 SED for the Japanese and Korean markets. Prices in September 1997 for pruned high quality logs ranged between NZm^3 230 – 235. Contract supply prices depend on recent export market conditions and previous quarter stumpage prices. Prices vary according to log specification, grade, species and market destination.

3.b. Price adjustment in Australia

Long term contracts from state forest plantations and native forests in New South Wales are for terms up to 15 years. Contracts are initially negotiated on a one-to-one basis with six-monthly reviews. Contract prices are adjusted on the basis of price movements as recorded in the Consumer Price Index (CPI). While these price adjustments maintain the real price level of the contract throughout the contract period they do not reflect any productivity gains made in the processing industries, downstream market conditions or slowdown in the demand for processed timber. As processors are subject to variability in lumber prices but not input log prices their profit margins are squeezed in times of declining economic conditions. These circumstances have pressured state government forest agencies to reconsider price adjustment processes as part of long term contracts.

State Forests of New South Wales is considering the introduction of a contract price mechanism based on the movement in prices in the downstream lumber market. Each processed product was identified in a survey of timber merchants and price movements for each product recorded to determine a weighted price index of lumber at the wholesale level. The survey used species, end product use and hardwood / softwood breakdowns to distinguish variations in price movements between 1997-98. During this period percentage change in price for softwood timbers radiata pine and hoop pine increased by 5.52% and 3.34% respectively. New South Wales State Forests are considering the construction of a permanent price index series to replace the CPI a price adjustment mechanism for long term supply contracts. The term of the contract is also being shortened to allow new log price negotiations.

3.c. Log Price adjustment in Queensland

Many long term log contracts with the Queensland Department of Primary Industries – Forestry (QDPI-F) are for 10 to 20 years in duration. Contracts are negotiated on a

one-to one basis between buyer and seller and contract prices are reviewed six monthly and annually for adjustment. Price adjustments are based on movements in the CPI and major reviews are undertaken on a five year basis to adjust contract conditions in line with current market and economic conditions.

QDPI-F is also considering the implementation of a wood weighted price index of processed lumber (WWI) for adjusting log contract prices. The rationale is for log input prices to processors to be more sensitive to variations in market conditions affecting downstream processing industries. With a downturn in economic or market conditions, lumber merchants argue they require flexibility in supply of log inputs and log prices to prevent profit squeeze. Annual reviews are used to adjust contract prices by a price index and to account for other arbitrary adjustments due to movements in market conditions. QDPI-F refers to these arbitrary adjustments as the Factor Adjustment System (FAS). A limited product mix WWI price adjustment mechanism has been tested on a partial basis for some processors. This indicates that major government forest log suppliers are prepared to move to a more market price adjustment process for long-term contract price adjustment. Unlike Canada, the other highly government regulated timber supply market, QDPI-F currently is only prepared to partially implement a price index adjustment mechanism allowing non-price factors to have a bearing on final price adjustment in long-term contracts. While moving towards a price index adjustment system QDPI-F still wants considerable discretionary control over price adjustment of log contracts.

Conclusions and Implications

There is considerable variation in log pricing policies and supply conditions at an international level. Some countries are highly market-oriented in establishing stumpage or log prices while others are highly government regulated. Only for those countries where long-term supply contracts for logs exist is a price adjustment process applied to maintain the real value of the log contract. The most favoured adjustment mechanism is a price index based on a moving average of prices achieved for semi-processed downstream timber products – outputs from the processors. For the more market oriented sales environments, log sales are negotiated through spot market sales. Again, price indices of spot market sales are generated to inform buyers and sellers in the market of trend and expected sale prices of timber lots. In both instances, price indices play an important role in providing information to growers of log sale prices and expected prices from future sales.

Small-scale forest farmers' incomes will be affected by price adjustment mechanisms applied to large commercial softwood plantation growers supplying logs on long-term contracts. Price adjustment mechanisms applied to these larger suppliers set a base price from which future sale prices in spot markets are determined. If most small-scale forest farmers operate in the spot market, spot market log prices will be underpinned by the long-term contract prices. Price variations in the spot market can be expected as economic conditions and the demand for timber outputs change. Both previous log prices and economic conditions are important in determining current market value for logs. The relative importance of previous log prices and the impact of economic conditions is postponed for later research. Nevertheless, as highly regulated log markets move more towards a market orientation, log price adjustment

processes for long-term log contract supply should include relevant market price indices derived from downstream timber product markets. As is witnessed in this paper, both New South Wales and Queensland are now moving away from the use of simple CPI adjustment pricing to more relevant log market price indices for stumpage determination and contract price adjustment. Further research on the relative importance of these concepts is required to determine the full impact on small-scale forest farmers' income.

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